

1 What is claimed is:

1 1. A rotational positioning device comprising:

2 a yoke for rotatably supporting an article, the article being rotatable relative to  
3 the yoke about a first rotational axis;

4 a first voice coil actuator for causing the article to rotate about the first rotational  
5 axis;

6 a base assembly, mechanically coupled to the yoke, the yoke being rotatable  
7 relative to the base about a second rotational axis orthogonal to the first rotational axis;  
8 and

9 a second voice coil actuator for causing the yoke and the supported article to  
10 rotate about the second rotational axis;

11 whereby the article may be positioned about the first and second rotational axes  
12 by adjusting current supplied to the first and second voice coil actuators.

1 2. The positioning device of claim 1, wherein the article comprises a video camera, the  
2 first rotational axis is a substantially horizontal axis perpendicular to an optical axis of  
3 the camera, and the second rotational axis is a substantially vertical axis.

1 3. The positioning device of claim 1, wherein the second voice coil actuator comprises a  
2 generally planar coil assembly comprising at least two coils to which current may be  
3 independently supplied.

1 4. The positioning device of claim 3, wherein the coil assembly is fixedly coupled to the  
2 yoke for co-rotation therewith, and the second voice coil actuator further comprises a  
3 set of concentrically arranged permanent magnets fixedly attached to the base  
4 assembly.

1 5. The positioning device of claim 1, further comprising a control system for controlling  
2 positioning of the article about the first and second rotational axes.

1 6. The positioning device of claim 5, wherein the control system further comprises:  
2 a set of sensors for continuously generating signals representative of the angular  
3 position of the article;  
4 at least one processor, coupled to the set of sensors, for receiving the signals and  
5 responsively adjusting the current supplied to the first and second voice coil actuators  
6 such that the article is caused to rotate in the direction of a desired angular position.

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1 7. Rotational positioning apparatus, comprising:  
2 means for supporting an article to be positioned;  
3 a base, mechanically coupled to the supporting means such that the supporting  
4 means and the article are rotatable about a first rotation axis relative to the base; and  
5 a voice coil actuator for causing the article and supporting means to rotate  
6 relative to the base, the voice coil actuator including a voice coil assembly fixedly  
7 coupled to one of the supporting means or the base, and a set of permanent magnets  
8 fixedly coupled to the other of the supporting means or the base.

1 8. The apparatus of claim 7, wherein the supporting means comprises:  
2 first supporting means fixedly attached to the article;  
3 second supporting means mechanically coupled to the first supporting means  
4 such that the first supporting means are rotatable relative to the second supporting  
5 means about a second rotation axis orthogonal to the first rotation axis; and  
6 actuator means for causing the first support means to be rotated relative to the  
7 second support means.

1 9. The apparatus of claim 8, wherein the actuator means comprises a second voice coil  
2 actuator.

1 10. The apparatus of claim 7, further including means for controlling an angular  
2 position of the article.

1 11. The apparatus of claim 10, wherein the means for controlling further comprises:  
2 angular position sensing means for detecting the angular position of the article  
3 and responsively generating angular position signals;  
4 processing means, electronically coupled to the angular position sensing means,  
5 for receiving the angular position signals and responsively adjusting current supplied  
6 to the voice coil actuator to move the article in the direction of a predetermined angular  
7 position setpoint.